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PATENT JOURNAL

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HAIR SHAMPOO COMPOSITION

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[There are no amendments to this patent.]

Abstract

Objective

To offer a high-quality hair shampoo composition that has excellent feel during brushing, does not leave hair stiff, even when dried, and is soft to the touch.

Means

A composition that contains (A) at least one anionic surfactant used as a surfactant, and (B) a macromolecular substance having cationic groups, where the average particle diameter of the precipitate produced upon diluting the liquid is 20 μm or less 5 min after dilution.

Claim

A hair shampoo composition, characterized by containing (A) at least one anionic surfactant used as a surfactant, and (B) a macromolecular substance having cationic groups, where the average particle diameter of the precipitate produced when the liquid is diluted is 20 μm or less 5 min after dilution.

Detailed explanation of the invention

(0001)

The present invention concerns a high-quality hair shampoo composition that provides excellent feel during brushing, does not leave hair stiff, even when dried, and is soft to the touch.

(0002)

Prior art

Feel during brushing and after drying are the most important performance considerations for consumers of shampoos, rinses or shampoos that have treatment effects. When macromolecular substances having cationic groups are used in compositions that contain blended anionic surfactants, a precipitate is produced when the original solution is diluted. It is a well-known fact that a precipitate is produced in this same manner when hair is cleaned, and that washing performance is enhanced when hair is washed because this precipitate is adsorbed onto the hair. However, a composition has not yet been offered that adequately responds to the demands of the consumer from the standpoint of stiffness and softness during drying, which is another important performance consideration.

(0003)

Problems to be solved by the invention

Consequently, the objective of the present invention is to offer a high-quality hair shampoo composition that can provide performance parameters that are most important to the consumer, e.g. excellent feel during brushing, lack of stiffness when hair is dry, and a soft feel to the touch.

(0004)

Means to solve the problems

The inventors of the present invention carried out painstaking investigations towards a solution to the problems described above, and perfected the present invention upon discovering that excellent feel during brushing, a lack of stiffness when hair is dried, and an excellent soft feel to the touch are produced when a hair shampoo composition contains at least one anionic surfactant and a macromolecular substance having cationic groups, where the average particle diameter of the precipitate produced upon diluting said hair shampoo composition is 20 μm or less 5 min after dilution.

(0005)

Specifically, the present invention offers a hair shampoo composition, characterized by containing (A) at least one anionic surfactant used as a surfactant, and (B) a macromolecular

substance having cationic groups, where the average particle diameter of the precipitate produced upon diluting the liquid is 20 μm or less 5 min after dilution.

(0006)

Mode of implementation of the invention

The present invention is described in detail below, but the present invention is not limited to the content of the descriptions presented below. A critical feature of the present invention is that it contains at least one anionic surfactant and a macromolecular substance that contains cationic groups, where the average particle diameter of the precipitate obtained upon diluting the liquid is 20 μm or less 5 min after dilution.

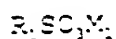
(0007)

The anionic surfactant that is used as the (A) component is ordinarily blended in the composition at about 1-50 wt%, with about 5-30 wt% being preferred. One type of surfactant or a combination of different surfactants can be blended in the composition. The anionic surfactant is an essential component of the present invention, and any combination can be used, provided that the average particle diameter of the precipitate that is produced upon diluting the liquid is not outside the range of 20 μm or less.

(0008)

The following compounds are provided as examples of effective anionic surfactants.

1) The sulfonic acids expressed by General Formula I below:



(I)

R_1 in General Formula I denotes a C_{1-20} alkyl group, alkenyl group or hydroxyalkyl group, where said alkenyl group includes α -olefins, vinylidenes or inner olefin alkenyls, M_1 denotes a hydrogen atom or a cation derived from a base that is used to neutralize the sulfonic acid, where said cation includes, in addition to alkali metal ions and alkaline earth metal ions, cations that are formed by basic amino acids or amines, such as alkyl-substituted ammonium ions or hydroxyalkyl-substituted ammonium ions.

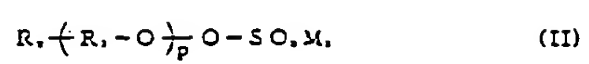
(0009)

Specific examples of sulfonates expressed by General Formula I are various α -olefin sulfonate salts (AOS salts) and paraffin sulfonates.

(0010)

2) The ether sulfates expressed by General Formula II below:

Structure 1



In General Formula II, p denotes integers of 1-10, R₁ denotes a C₈₋₂₂ alkyl or an alkylphenyl having a C₈₋₁₈ alkyl group, and R₂ denotes a C₂₋₁₀ alkylene group. In addition, M₁ denotes a hydrogen ion or a cation derived from a base that is used to neutralize the ether sulfate, where said cation includes, in addition to alkali metal ions and alkaline earth metal ions, cations that are formed by basic amino acids or amines, such as alkyl-substituted ammonium ions and hydroxyalkyl-substituted ammonium ions.

(0011)

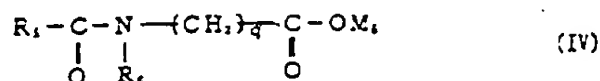
Specific examples of the ether sulfates expressed by General Formula II include polyoxyethylene (p=3) lauryl ether sulfate or C₁₂₋₁₈ aliphatic alcohol oxyethylene ether sulfates. It is preferable for these substances to have the form of sodium, potassium or alkanolamine salts. A particularly desirable example of an ether sulfate expressed by General Formula II is the sodium salt of polyoxyethylene (p=3) lauryl ether sulfate.

()

(0014)

4) N-acyl-N-alkylamino acids or N-acylamino acids and salts thereof expressed by General Formula IV below:

Structure 3



In General Formula IV, q denotes 1 or 2, R₁ denotes a C₁₋₁₂ alkyl group, alkenyl group or hydroxyalkyl group, R₂ denotes a hydrogen atom or C₁₋₄ alkyl group. M₂ denotes a hydrogen atom or a cation derived from a base that is used to neutralize the compound expressed by General Formula IV, where said cation includes alkali metal ions, alkaline earth metal ions, and ammonium ions, as well as cations formed by basic amino acids or amines, such as alkyl-substituted ammonium ions or hydroxyalkyl-substituted ammonium ions.

(0015)

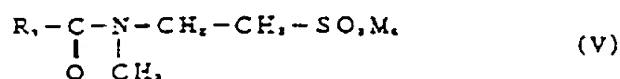
Specific examples of compounds expressed by General Formula IV include N-lauroyl-N-ethylglycine, N-lauroyl-N-isopropylglycine, N-lauroylsarcosine, N-palmitoylsarcosine, N-lauroyl-N-methyl-β-alanine, N-lauroyl-N-ethyl-β-alanine, N-myristoyl-β-alanine,

N-palmitoyl- β -alanine; mixtures of the aforementioned compounds; and monoethanolamine, diethanolamine, triethanolamine, sodium or potassium salts of the aforementioned compounds.

(0016)

5) Acylmethylethylamine salts expressed by General Formula V below:

Structure 4



R₁ in General Formula V denotes a C₁₋₁₇ alkyl group, alkenyl group or hydroxyalkyl group, M₂ denotes a hydrogen atom or a cation derived from a base that is used to neutralize the taurine, where said cation includes alkali metal ions, alkaline earth metal ions, and ammonium ions, as well as cations formed by basic amino acids or amines, such as alkyl-substituted ammonium ions or hydroxyalkyl-substituted ammonium ions.

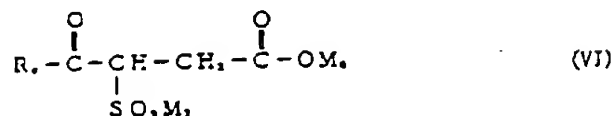
(0017)

A specific example of a compound expressed by General Formula V is N-cocoylmethylethylamine sodium salt.

(0018)

6) The sulfosuccinic acid compounds expressed by General Formula VI below:

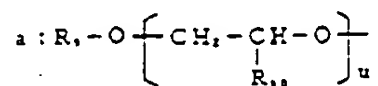
Structure 5

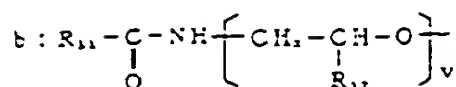


In General Formula VI, R_1 denotes a substituent represented by a or b below, and M_1 and M_2 can be the same or different, denoting hydrogen atoms or cations derived from a base that is used to neutralize the compound expressed by General Formula VI, where said cation includes alkali metal ions, alkaline earth metal ions, and ammonium ions, as well as cations formed by basic amino acids or amines such as alkyl-substituted ammonium ions or hydroxyalkyl-substituted ammonium ions.

(0019)

Structure 6



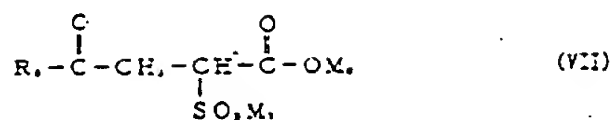


In substituent (a) above, R_9 denotes a C_{6-12} alkyl group, alkenyl group or hydroxyalkyl group, R_{10} denotes a hydrogen atom or methyl group and u denotes integers of 10-20. In addition, R_{11} in substituent (b) denotes a C_{6-12} alkyl group, alkenyl group or hydroxyalkyl group, R_{12} denotes a hydrogen atom or methyl group and v denotes integers of 0-20. A specific example of the compound expressed by General Formula VI is disodium polyoxyethylene laurylsulfosuccinic acid.

(0020)

7) The sulfosuccinic acid-type compounds expressed by General Formula VII below:

Structure 7



The compounds expressed by General Formula VII are compounds having the same structures as the compounds expressed by General Formula VI, with the exception that the location of the SO_3M_1 substituent is different.

(0021)

8) The alkyloylalkyltaurine type compounds expressed by Formula VIII below:

Structure 8



In General Formula VIII, R_1 denotes a C_{1-15} alkyl group, alkenyl group or hydroxyalkyl group, R_2 denotes a lower alkyl group with an average carbon number of 1-3 and M_1 denotes an alkali metal, alkaline earth metal or organic amine.

(0022)

9) The ether carboxylic acid compounds expressed by General Formula IX below:



In General Formula IX, R_{11} denotes a C_{1-22} alkyl group or alkenyl group, m denotes 2-15 and M_{10} denotes an alkali metal, alkaline earth metal, ammonium or organic ammonium.

(0023)

The following compounds are provided as examples of macromolecular substances that include cationic groups, which are used as component (B). These macromolecular substances can be used individually or in combinations of 2 or more. The blend amounts have no specific restrictions, but 0.01-2.0 wt% is preferred. The names of said compounds are those used by the Cosmetic, Toiletry and Fragrance Association, and are names that are defined in the CTFA Cosmetic Ingredient Dictionary published by this group in 1982, or in the 1995 supplement.

(0024)

Examples of useful macromolecular substances for the composition of the present invention include polyquaternium-1, polyquaternium-2, polyquaternium-3, polyquaternium-4, polyquaternium-5, polyquaternium-6, polyquaternium-7, polyquaternium-8, polyquaternium-9, polyquaternium-10, polyquaternium-11, polyquaternium-12, polyquaternium-13, polyquaternium-14, polyquaternium-15, polyquaternium-16, polyquaternium-17, polyquaternium-18, polyquaternium-19, polyquaternium-20, polyquaternium-22, polyquaternium-24, polyquaternium-27, polyquaternium-28, polyquaternium-29, polyquaternium-30, polyquaternium-31, polyquaternium-32, polyquaternium-33, polyquaternium-34, polyquaternium-35, polyquaternium-36, polyquaternium-37, polyquaternium-39, polyquaternium-42, polyquaternium-43, polyquaternium-44 and mixtures of these compounds. In addition, guar hydroxypropyltrimethylammonium halides are also useful.

(0025)

Of these macromolecular substances, particularly appropriate substances are those wherein the cation group contained in the macromolecular substance is a trimethyl quaternary ammonium. Specific examples are polyquaternium-7, polyquaternium-10, polyquaternium-11, polyquaternium-22, polyquaternium-39, polyquaternium-44 and guar-hydroxypropyltrimethylammonium halide.

(0026)

The hair shampoo compositions that are formed from these macromolecular substances and the aforementioned anionic surfactants generate a precipitate when they are diluted from their original solutions, and the average particle diameter of this precipitate must be 20 μm or less. If the average particle diameter of the precipitate exceeds 20 μm , it will not be possible to achieve the desired effects of the present invention (good feel during brushing, lack of stiffness when dry and softness).

(0027)

There are no particular restrictions on the dilution ratio when diluting the hair shampoo composition of the present invention. In the process wherein said composition is applied to the hair, lathered and washed, the starting liquid of said composition is diluted, and precipitate is generated, but it is extremely critical that the average particle diameter of this precipitate be 20 μm or less 5 min after dilution. In general, a dilution ratio of 2-50x with respect to the starting liquid is envisioned. Precipitate is generated at any ratio within this range, and it is necessary that the average particle diameter of the precipitate be 20 μm or less after 5 min.

(0028)

With regard to pearl-gloss compositions or compositions containing blended emulsifiers or dispersants, testing can be

carried out after eliminating suspended matter from the system by pressure filtration. The presence of this suspended matter in the system will not cause the effects to vary. Silicone derivatives such as dimethylpolysiloxane or oil components are removed from the present invention when present in the original liquid of said composition. This is because the precipitate that is generated upon dilution as described in the present invention is not visibly present in the starting liquid.

(0029)

In addition to the aforementioned two essential components, known blend agents that are blended in conventional hair shampoo compositions can be blended, as necessary in the hair shampoo composition of the present invention in ranges in which attainment of the objectives of the present invention is not impeded.

(0030)

Examples of blend agents that can be blended as necessary in the shampoo composition of the present invention include alkylbetaine, amidopropylbetaine, imidazolinium betaine, sulfobetaine, phosphobetaine, and amidobetaine amphipathic surfactants and other amphipathic surfactants; alkyltrimethylammonium salts and other cationic surfactants; coconut oil fatty acid alkanoyl amides, sucrose fatty acid esters, alkylglycosides, methylglycoside fatty acid esters and other nonionic surfactants; dimethylpolysiloxane and other siloxane derivatives, emulsions thereof, or agents for improving

feel, such as vegetable oils; polyols, inorganic salts, organic salts and other solubilizers; 2,6-di-t-butyl-p-cresol (BHT), α -tocopherols and other antioxidants; hydroxyethyl cellulose and other thickeners; ethanol, hexylene glycol and other viscosity reducers; oxybenzone and other ultraviolet absorbers, protein derivatives, vegetable matter extracts and other moisturizers; piroctone olamine, zinc pirithione and other anti-dandruff agents; benzoic acid and salts thereof, paraoxybenzoic acid derivatives, keson [transliteration] CG and other preservatives; citric acid, triethanolamine and other pH adjusters; ethylene glycol di-fatty acid esters and other pearling agents; acrylic acid-based macromolecular substances and other dispersion/suspension agents; dyes; and fragrances.

(0031)

Application examples

The present invention is described in additional detail below using application examples, but the present invention is not limited to these application examples. The various evaluative methods are described below in advance of the application example.

(0032)

The hair shampoo compositions having the compositions shown in Tables I and II were manufactured by a common method, and each was then evaluated in terms of the particle diameter of the insoluble matter that precipitated during dilution, the

conditioning effects with respect to hair, the feel during brushing and the feel after hair drying. The evaluative methods and standards indicated below were used.

(0033)

Precipitation of insoluble matter and particle diameter measurement

The shampoo was diluted 2-50x, and the presence of cloudiness or insoluble matter that precipitated as sediment was observed visually. After 5 min, the particle diameter was measured using an automatic centrifugal particle diameter measurement device (Horiba Seisakujo CAPA-500).

Precipitation

- OO: Large amount of precipitate
- O: Fairly large amount of precipitate
- Δ: Slight precipitation observed
- X: No precipitation

(0034)

Conditioning effects, feel during brushing, feel after drying

10. expert panelists washed their hair using each of the shampoo compositions, and the condition effects, suppleness, sleekness and stickiness were evaluated according to the standards presented below.

Conditioning effects

OO: Extremely soft

O: Fairly soft, not squeaky

Δ: Inferior softness, somewhat squeaky

X: No softness, extremely squeaky

Sleekness/stickiness

OO: sleek, not sticky

O: Sleek, almost no stickiness

Δ: sleek, some stickiness

X: sleek, very sticky

Stiffness when dry

OO: No stiffness

O: Almost no stiffness

Δ: Somewhat stiff

X: Extremely stiff

Suppleness when dry

OO: Extremely supple

O: Fairly supple

X: Poor suppleness

(0035)

Application Example 1

The shampoo composition having the composition shown in Table I was manufactured according to a common method, and was evaluated according to the various parameters described above.

(0036)

Table I

Polyoxyethylene (3) lauryl ether sodium sulfate	15	%
Lauric acid amide propylene betaine	5	%
0-(2-hydroxy-3-(trimethylammonium)propyl)-hydroxyethylcellulosolve chloride ^{*1}	0.5	%
Dimethyldiallylammonium chloride/acrylic acid copolymer ^{*2}	0.5	%
Sodium chloride	1.0	%
Fragrance	0.5	%
Citric acid	0.1	%
Water	77.6	%

Note: *1: Polyquaternium-10 (Polymer JR, manufactured by UCC)

*2: Polyquaternium-22 (Makoto [transliteration] 280, manufactured by Calgon)

(0037)

The compositions of Application Example 1 had an average particle diameter of 10 μm after 5 min when diluted 10x. The evaluations carried out according to the aforementioned standards for each of the parameters above were 00, and the composition had excellent properties pertaining to conditioning effects, sleekness, stickiness, stiffness after drying and suppleness.

(0038)

Application Example 2

The shampoo composition having the composition shown in Table II was manufactured according to a common method, and was evaluated according to the various parameters described above.

(0039)

Table II

Polyoxyethylene (3) sodium laurylacetate	10	%
Coconut oil fatty acid diethanolamide	4	%
Dimethyldiallyl chloride/acrylamide copolymer ³	0.6	%
Ethylene glycol distearate	1.0	%
Piroctone olamine	0.7	%
Fragrance	0.5	%
Citric acid	0.3	%
Water	82.9	%

Note: ³: Polyquaternium-7 (Calgon, Makoto[transliteration] 550)

(0040)

The composition of Application Example 2 had an average particle diameter of 8 μ m after 5 min when diluted 5x. The evaluations carried out according to the aforementioned standards for each of the parameters above was 00, and the composition had excellent properties pertaining to conditioning effects, sleekness, stickiness, stiffness after drying and suppleness.

(0041)

Comparative example

The shampoo composition having the composition shown in Table III was manufactured according to a common method, and was evaluated according to the various parameters described above.

(0042)

Table III

Polyoxyethylene (3) lauryl ether sodium sulfate	15	%
Lauric acid amide propyl betaine	5	%
0-(2-hydroxy-3-(trimethylammonium)propyl)-hydroxyethylcellulose chloride ¹	0.5	%
Sodium chloride	1.0	%
Fragrance	0.5	%
Citric acid	0.1	%
Water	77.9	%

(0043)

The composition of Comparative Example 3 had an average particle diameter of 20 μm or greater after 5 min when diluted 10x, and although the evaluation was 00 for the conditioning effects, the evaluation of Δ was made with respect to sleekness, stickiness and stiffness when dry. The evaluation for the suppleness when dry was X.

(0044)

Effect of the invention

The hair shampoo composition of the present invention contains (A) at least one anionic surfactant as a surfactant and (B) a macromolecular compound containing cationic groups, where the average particle diameter of the precipitate that precipitates upon diluting the liquid is 20 μm or less 5 min after dilution. As a result, excellent feel when brushing, excellent suppleness, and a lack of stiffness when hair is dry, can be obtained.